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EXAMINER	
KALLIS, RUSSELL	
ART UNIT	PAPER NUMBER
1638	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/25/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/735,242	DEHESH, KATAYOON	
	Examiner	Art Unit	
	Russell Kallis	1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 October 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *37-65* is/are pending in the application.

4a) Of the above claim(s) *37-51 and 65* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *52-64* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/26/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of Group II claims 52-64 is acknowledged. The traversal is on the ground(s) that the inventions of Groups I and II are not distinct. This is not found persuasive because the method for altering fatty acid composition in a host cell of Group I and the method of modifying fatty acid content in the seed of a transformed plant are different methods drawn to different starting materials and different end products and are therefore distinct.

The requirement is still deemed proper and is therefore made FINAL.

Claims 37-65 are pending. Claims 37-51 and 65 are withdrawn. Claims 52-64 are examined.

Priority

The first line of the specification should indicate if the prior application has issued as a patent. In this case 09/915,182 is now U.S. Patent 6,706,950.

Specification

The disclosure is objected to because of the following informalities: The spelling of "*pullcherrima* " and "*pullcherima*" in the specification on page 28 in line 5, and page 30 in line 25 should be "*pulcherrima*".

The incorporation of essential material in the specification by reference to an unpublished U.S. application, foreign application or patent, or to a publication is improper. Applicant is required to amend the disclosure to include the material incorporated by reference, if the material is relied upon to overcome any objection, rejection, or other requirement imposed by the Office.

The amendment must be accompanied by a statement executed by the applicant, or a practitioner representing the applicant, stating that the material being inserted is the material previously incorporated by reference and that the amendment contains no new matter. 37 CFR 1.57(f). Moreover, the WO 98/4776 reference from which improper incorporation is made of KASI, KAS II and KASIV sequences from *C. pulcherrima* as well as the vectors referred to in the specification does not mention or describe any of those sequences.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 52, 55-63 and 64 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicant broadly claims a method of modifying the saturated fatty acid content in transgenic plant seeds that comprises heterologous expression of any beta-ketoacyl-ACP synthase protein and heterologous expression of any desaturase protein.

Applicant describes a polynucleotide of SEQ ID NO: 1 from *Synechocystis* encoding a polypeptide of SEQ ID NO: 2; and attempts to incorporate through reference (see above) the following seed specific expression cassettes for *Brassica* transformation (pCGN8378) and soy

transformation (pCGN9807) comprising polynucleotides from *C. pulcherrima* encoding KASI and KASIV (WO 98/46776) having acyl chain specificities from 2:0-ACP to 14:0-ACP, and 8:0-ACP or medium chain length acyl chain substrates respectively; and seed specific expression cassettes (pCGN3231 from U.S. Patent 5,723,595) for *Brassica* transformation and (pCGN9883) for soy transformation comprising the safflower delta-9 desaturase gene (G. Thompson *et al.*, PNAS, Vol. 88, pp. 2578-2582).

Applicant does not describe any isolated polynucleotides encoding a KAS activity other than SEQ ID NO: 1 from *Synechocystis* encoding a polypeptide of SEQ ID NO: 2; further the genes for KASI and KASIV from *C. pulcherrima* (WO 98/46776); or a polynucleotide encoding a desaturase protein other than the safflower delta-9 desaturase (Thompson *et al.* PNAS Vol. 8 pp. 2578-2582) have been improperly incorporated through reference.

The Federal Circuit has recently clarified the application of the written description requirement to inventions in the field of biotechnology. The court stated that, "A description of a genus of cDNAs may be achieved by means of a recitation of a representative number of cDNAs, defined by nucleotide sequence, falling within the scope of the genus or of a recitation of structural features common to members of the genus, which features constitute a substantial portion of the genus." *See University of California v. Eli Lilly and Co.*, 119 F.3d 1559; 43 USPQ2d 1398, 1406 (Fed. Cir. 1997).

Applicants fail to describe a representative number of beta-ketoacyl-ACP synthase proteins or desaturase proteins. Applicants only describe SEQ ID NO: 1 from *Synechocystis* encoding a polypeptide of SEQ ID NO: 2; polynucleotides from *C. pulcherrima* encoding KASI and KASIV (WO 98/46776) having acyl chain specificities from 2:0-ACP to 14:0-ACP, and 8:0-

ACP or medium chain length acyl chain substrates respectively; and the safflower delta-9 desaturase gene (G. Thompson *et al.*, PNAS, Vol. 88, pp. 2578-2582). Furthermore, Applicants fail to describe structural features common to members of the claimed genus of synthase or desaturase genes. Hence, Applicants fail to meet either prong of the two-prong test set forth by *Eli Lilly*. Furthermore, given the lack of description of the necessary elements essential for synthase or desaturase activity or what are the products of the enzymatic activity of the broadly claimed genus of synthases and desaturases, it remains unclear what features identify a beta keto-acyl-ACP synthase or a desaturase. Since the genus of synthases or desaturases has not been described by specific structural features, the specification fails to provide an adequate written description to support the breath of the claims.

More over, the claimed sequences encompass naturally occurring allelic variants, mutants of beta-ketoacyl-ACP synthases and desaturases, as well as sequences encoding proteins having no known synthase or desaturase activity, of which Applicant is not in possession. Accordingly, the specification fails to provide an adequate written description to support the genus of synthase or desaturase encompassed by the claims.

Claims 52, 56-63 and 64 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a method of decreasing the saturated fatty acid content in transgenic plant seeds transformed with SEQ ID NO: 1 and a delta 9 desaturase from sunflower; or in the seeds of a transgenic plant transformed with a KASI and KAS IV beta-ketoacyl-ACP synthase from *C. pulcherrima* and a delta-9 desaturase from sunflower, does not reasonably provide enablement for modifications other than decreasing saturated fatty acid content or for decresing saturated fatty acid content in a transformed seed using . The specification does not

enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims.

Applicant broadly claims a method of modifying the saturated fatty acid content in transgenic plant seeds that comprises heterologous expression of any beta-ketoacyl-ACP synthase protein and heterologous expression of any desaturase protein.

Applicant teaches isolation of a polynucleotide of SEQ ID NO: 1 from *Synechocystis* encoding a polypeptide of SEQ ID NO: 2; transformed *Brassica* having less than about 3.5% weight percent saturated fatty acid in plants co-expressing beta-ketoacyl-ACP synthase genes from *C. pulcherrima* encoding KASI and KASIV (WO 98/46776) and the safflower delta-9 desaturase gene (G. Thompson *et al.*, PNAS, Vol. 88, pp. 2578-2582); and transformed soybean having less than about 3.5% weight percent saturated fatty acid in plants expressing a beta-ketoacyl-ACP synthase from *C. pulcherrima* encoding KASI and KASIV (WO 98/46776) and the safflower delta-9 desaturase gene (G. Thompson *et al.*, PNAS, Vol. 88, pp. 2578-2582) (see specification pages 29-31 and figure 1).

Applicant does not teach modified fatty acids in transformed plant seeds other than reduced saturated fatty acids in plants transformed with any other polynucleotide encoding a beta-ketoacyl-ACP synthase isolated from any other source other than the beta-ketoacyl-ACP synthase gene from *Synechocystis* od SEQ ID NO: 1 encoding SEQ ID NO: 2 and the genes from *C. pulcherrima* encoding KASI and KASIV in concert with the polynucleotide encoding the safflower delta 9 desaturase.

Isolating DNA fragments using stringent hybridization conditions, does not always select for DNA fragments whose contiguous nucleotide sequence is the same or nearly the same as the

probe. Fourgoux-Nicol et al (1999, Plant Molecular Biology 40 :857-872) teach the isolation of a 674bp fragment using a 497bp probe incorporating stringent hybridization conditions comprising three consecutive 30 minute rinses in 2X, 1X and 0.1X SSC with 0.1% SDS at 65^0C (page 859, left column, 2nd paragraph). Fourgoux-Nicol et al also teach that the probe and isolated DNA fragment exhibited a number of sequence differences comprising a 99bp insertion within the probe and a single nucleotide gap, while the DNA fragment contained 2 single nucleotide gaps and together the fragments contained 27 nucleotide mismatches. Taking into account the insertions, gaps and mismatches, the longest stretch of contiguous nucleotides to which the probe could hybridize consisted of 93bp of DNA (page 862, Figure 2).

Further, the isolation of orthologous DNA sequences from other species introduces an element of unpredictability. The limitation is introduced in finding homologous regions that would adequately enable either PCR amplification or southern hybridization and would entail using either degenerate primers or probes with limited homology. Thus the screen for orthologous sequences would isolate many genes other than those of interest. The inherent unpredictability in isolation of a homologous sequence encoding the same protein activity is illustrated in an example where a small number of changes to the coding region for a strict desaturase resulted in an enzyme with a hydroxylase activity and that a small number of changes to the coding region of a desaturase could account for the functional divergence seen across a range of enzymes involved in fatty acid metabolism (Broun *et al.* Science Vol. 282, 13 November 1998; Abstract lines 4-6 and p. 1317 column 1, lines 51-56).

Given the lack of guidance for isolating any other beta-ketoacyl-ACP synthase gene, or for producing plants transformed with varied sequence identities to SEQ ID NO: 1 encoding a

beta-ketoacyl-ACP synthase from *Synechocystis* or any other non-exemplified genes encoding a beta-ketoacyl-ACP synthase of unspecified substrate specificity, the breadth of the claims, and given the unpredictability in the art, undue trail and error experimentation would be needed by one skilled in the art to isolate a multitude of non-exemplified beta-ketoacyl-ACP synthase genes, or to evaluate the ability of a multitude of non-exemplified beta-ketoacyl-ACP synthase genes or non-exemplified gene fragments to alter the phenotype of a multitude of non-exemplified transformed plant species. Therefore, the invention is not enabled for the scope set forth in the claims.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 52 is rejected under 35 U.S.C. 102(b) as being anticipated by Knauf V. *et al.*, U.S. Patent 5,510,255 published April 23, 1996.

Applicant broadly claims a method of modifying the saturated fatty acid content in transgenic plant seeds that comprises heterologous expression of any beta-ketoacyl-ACP synthase protein and heterologous expression of any desaturase protein.

Knauf teaches the use of an isolated nucleotide encoding a beta-ketoacyl-ACP synthase II or isolated nucleotides encoding both a beta-ketoacyl-ACP synthase II and a delta-9 desaturase together in a vector or in separate vectors for the production of fatty acids having little or no completely saturated chains in the seeds of either corn, rapeseed, or soybean (Abstract lines 1-3,

Column 8 lines 47-52, Column 52 lines 56-67, and Column 99 lines 51-54). Thus, the reference teaches all of the limitations of Claims 1, 7-8, 10-21 and 31-36.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 52-64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knauf *et al.* U.S. Patent 5,510,255 published April 23, 1996 in view of Kaneko T. *et al.,* DNA Research, Vol. 3, pp. 109-136, June 19, 1996 and in further view of Applicant's specification.

Applicant broadly claims a method of modifying the saturated fatty acid content in transgenic plant seeds that comprises heterologous expression of any beta-ketoacyl-ACP synthase protein and heterologous expression of any desaturase protein.

Knauf teaches the use of an isolated nucleotide encoding a beta-ketoacyl-ACP synthase II or isolated nucleotides encoding both a beta-ketoacyl-ACP synthase II and a delta-9 desaturase together in a vector or in separate vectors for the production of fatty acids having little or no completely saturated chains in the seeds of either corn, rapeseed, or soybean (Abstract lines 1-3, Column 8 lines 47-52, Column 52 lines 56-67, and Column 99 lines 51-54).

Knauf does not teach SEQ ID NO: 1 encoding SEQ ID NO: 2.

Kaneko teaches the protein sequence of SEQ ID NO: 2 of a beta-ketoacyl-ACP synthase II from *Synechocystis* that inherently teaches the polynucleotide coding sequence of SEQ ID NO: 1 encoding said protein.

Applicant's specification teaches that KAS I and IV sequences from *C. pulcherrima* and the sunflower delta 9 desaturase were known in the art.

It would have been obvious at the time of Applicant's invention to modify the invention of Knauf to substitute the beta-ketoacyl-ACP synthase II gene for the one taught by Kaneko. One of ordinary skill in the art would have been motivated by the teachings of Knauf that the plant genes encoding a beta-ketoacyl-ACP synthase and delta-9 desaturase are valuable materials for genetic engineering of a plant having little or no completely saturated fatty acid chains in their seeds as taught by Knauf, and that one would have had a reasonable expectation of success of expressing genes in transformed plants and reducing saturated fatty acid content; and that introducing the polynculeotides either by monocistronic, polycistronic or genetic crossing from separate plants; or including KASI and KASIV sequences known in the art instead of the KASII sequence of Knauf is obvious given the lack of criticality.

All claims are rejected.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Russell Kallis whose telephone number is (571) 272-0798. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anne Marie Grunberg can be reached on (571) 272-0975. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Russell Kallis Ph.D.
January 19, 2007

RUSSELL P. KALLIS, PH.D.
PRIMARY EXAMINER

Russell Kallis